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Temperature distribution in copper electrode during electrical discharge machining process (Article)

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Abstract

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This paper reports on a new method used to estimate the spark radius in the gap during electrical discharge machining (EDM). This method combines the heat flux and energy equations of the copper electrode. The energy partition between workpiece and electrode (tool) due to EDM process was estimated using the ratio of thermal conductivity of the workpiece to that of the electrode. Using the energy partition between the electrode and the workpiece, temperature distribution in the electrode was established and Gaussian heat distribution was used to analyze the energy released from a single spark. The energy released due to a single spark was used to calculate the fraction of energy received by the electrode based on its thermal conductivity. The 3-D temperature distribution in the electrode was carried out using ANSYS version 11.0 and the estimated temperature of the electrode from a single spark was validated by thermal diffusivity of the electrode material. The difference of 6% was recorded between the simulated and calculated temperatures of the copper electrode. Based on the achieved percentage error, the simulated temperature on the copper electrode can be accepted as EDM process.

Author keywords

EDM process Heat flux Spark radius Temperature distribution Thermal conductivity

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